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Letter to the Editor

Response to Letter to the Editor entitled: Macroscopically detected female genital injury after consensual and non-consensual vaginal penetration: A prospective comparison study [20(2013) 884–901]

Dear Sir,

Thank you for the opportunity to respond to the issues raised by Lo et al. (4 May 2014) with respect to our article "Macroscopically detected female genital injury after consensual and non-consensual vaginal penetration: a prospective comparison study".

The authors of the Letter outline their concerns about the high genital injury rate found in our study in the non-consenting group, in comparison to other studies in the literature, and the potential for 'oversimplification' and misinterpretation of the findings in the legal arena.

As we did in our paper, they draw attention to the small sample size ($n = 41$ non-consenting group; $n = 81$ consenting group) and the difference in 'penetration to examination time' (PET) between the two groups. They suggest that possible bias in recruitment to the non-consensual group has contributed to a higher genital injury rate. Importantly, they raise the issue of pre-existing genital infection and its relationship to genital injury susceptibility and interpretation.

1. Sample size

Our study was focused on female genital injury resulting from vaginal penetration, either consensual or non-consensual, and was primarily interested in injury prevalence, as well as the mechanism and pathology of genital injury. Because of problems with confounding variables identified in previous studies, we sought to ensure that the two comparison groups were as similar to each other as possible (except for the 'consent' issue), in an effort to achieve a more reliable interpretation of the findings and glean valuable information about the mechanism of sex-related genital injury. A single 'index' vaginal penetrative event within 72 h of genital examination allowed valid interpretation of causation and ensured a definitive PET. The decision to exclude any woman who had experienced another episode of vaginal penetrative sexual intercourse (SI) in the 72 h prior to examination, and to record other vaginal penetrative events such as vaginal speculum examination or tampon insertion within the same period, was essential to ensure that any genital injury identified had, in fact, resulted from the index penetrative event. We consider this information should be sought routinely from women undergoing forensic genital examination if genital injury findings are to be interpreted appropriately. This approach however, limited sample sizes and did not allow consideration of the full spectrum of scenarios in which vaginal penetrative sexual intercourse occurs. For this reason we highlighted in our paper, the need for large multi-centre trials with a similar commitment to methodological consistency.

2. Methodology for recruitment to the non-consensual group

Lo et al. have raised concerns about possible selection bias to the non-consensual group.

Participating doctors consecutively recorded female patients presenting for forensic sexual assault examination (non-consensual group) during their period of recruitment, on a *Data Collection Record Sheet* and listed the reason/s for not including a patient if they were excluded. Women were included if they had experienced only one 'episode' of vaginal penetrative SI within the previous 72 h, were aged 18–45 years, had non-pigmented skin, were competent to understand and discuss the study *Information Sheet*, and consented to participation. Recruitment of patients presenting for primary care genital examination to the consensual group was approached in the same way. However, discussion about the study took place before the genital examination with the consensual group and after the genital examination with the non-consensual group. Post-examination study discussion for the non-consensual group was a hospital ethics requirement, because of concerns that a sexually assaulted patient who might be anxious or apprehensive about a forensic examination, might be less likely to understand and consent 'freely' to participation in the study. We changed the protocol accordingly since we agreed that it was a valid point and did not consider that it would affect the recruitment to the study.

A total of 147 women reporting sexual assault to police were recorded by non-consensual group recruiting doctors over their recruiting periods; 41 fulfilled all inclusion criteria and were recruited to the non-consensual group and 106 were excluded because they did not fulfil inclusion criteria. No sexual assault patient who fulfilled inclusion criteria and was approached to participate in the study declined to be involved.

2.1. Inability to consent

Of the 106 sexual assault patients who were excluded, nine (9/106, 8%) were deemed incapable of understanding the *Information Sheet* and making an informed decision about participating in the study. Reasons for their inability to consent were recorded as intellectual impairment (6), psychiatric illness (2) and extreme distress (1).

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A patient's ability to consent to participation in research is mandatory and, whilst the exclusion of those who are not competent to understand and make an informed decision about participation will exclude a certain subgroup of patients, there is no alternative.

2.2. Altered consciousness and intoxication

Intoxication or altered consciousness at the time of vaginal penetrative SI has significant potential to affect the outcome of a study such as this. Sexual activity is frequently associated with the ingestion of alcohol or drugs, in both a consensual and non-consensual setting.

If a woman presented for genital examination after vaginal penetrative SI that had occurred during a period of altered consciousness or significant intoxication with alcohol and/or drugs, such that she had no memory of vaginal penetration having occurred, she was not recruited to the study unless:

i. She described genital symptoms consistent with recent vaginal sex such as 'wetness' or discomfort in the genital area, the smell of semen on her person, or a subjective feeling that she had experienced recent vaginal sex, or
ii. She was noted by the examining doctor to have genital findings suggestive of recent vaginal penetration such as change in tampon position, intra-vaginal foreign material or genital redness, swelling or injury.

The need to ensure that women who had not experienced any vaginal penetration were not included in the study, whilst also avoiding the potential for selection bias, presented a significant challenge. The decision to exclude those patients without any memory of a penetrative act or genital symptoms/signs suggestive of recent vaginal penetration, was not taken lightly. In our study, such a scenario was only encountered in the non-consensual group.

Of the 106 sexual assault patients who were excluded from participation, eight women thought they may have been sexually assaulted, but had no memory of a vaginal penetrative episode and no genital symptoms or signs to suggest recent vaginal penetrative SI; these women were not recruited to the study (8/106, 8%).

Nine of the 41 women recruited to the non-consensual group said they had been significantly intoxicated when sexually assaulted; details of these cases are given in Table 1. Four women had a clear memory of the vaginal penetrative episode and a witness was able to confirm for one woman that penile-vaginal penetration had occurred. Four women had no memory of vaginal penetration; of these four, two had noticed symptoms of recent vaginal sex afterwards and one said that she had discovered that a tampon which she had in situ prior to the incident, had been pushed further into the vaginal canal and mis-positioned at an angle. Only one intoxicated woman was included in the study solely because of the presence of genital injury.

The likelihood of genital injury during sexual intercourse when either or both parties are intoxicated is difficult to ascertain without some assessment of degree of intoxication. Injury may be more likely if parties are less inhibited and more readily engage in activities that might lead to injury, or less likely if a woman is incapacitated by intoxication, and offers little or no resistance to penetration.[1–3] Equally, significant genital injury can occur when a woman is not capable of interpreting pain or discomfort during penetration and/or indicating this to her partner during penetration because of intoxication. Furthermore, if intoxicated at the time of a sexual assault, a woman may present later for examination reducing the likelihood of injury detection.

In our study, the nine women who were vaginally penetrated whilst significantly intoxicated ranged in age from 21 to 44 years and were all examined within 24 h of the index penetration. Five of these nine women sustained genital injury (5/9, 55%). Of the 32 women in the non-consensual group who were not significantly intoxicated at the time of vaginal penetration, 17 sustained genital injury. There was no significant difference in genital injury prevalence between those in the non-consensual group who were significantly intoxicated at time of penetration (5/9) and those who weren't (17/32) [OR 1.10, CI (0.25, 4.88) $p = 0.90$].

If, as Lo et al. have suggested, we consider that the eight women who were excluded from the non-consensual group because of lack of a clear memory of penetration, and absence of symptoms/signs consistent with recent vaginal penetrative SI, had in fact been vaginally penetrated and therefore should have been included in the study, they can be added to the sample to give a total of 49 women in the non-consensual group (ie 41 + 8). The effect upon the overall non-consensual injury rate can be calculated by considering different scenarios as follows;

i. If the eight women were included and none were found to have genital injury, the non-consensual genital injury rate would be 45% (22/49) which remains significant when compared with the consensual group [OR 7.44, CI (2.96, 18.69), $p < 0.001$].
ii. If the eight women were included and all were found to have genital injury, the non-consensual injury rate would be 61% (30/49) which remains significant when compared with consensual group [OR 14.41, CI (5.69, 36.48), $p < 0.001$].
iii. If the eight women were included and four were found to have genital injury, the non-consensual injury rate would be 53% (26/49) which remains significant when compared with consensual group [OR 10.32, CI (4.11, 25.90), $p < 0.001$].

Inclusion of the eight women with no memory of penetration or signs/symptoms consistent with recent vaginal penetrative SI (as

Table 1
Cases involving significant intoxication at time of penetration.

Cases involving intoxication at time of penetration: all non-consensual						
	Age (yrs)	PET (hrs)	Type of pen. Article if recalled	Recall that condom or lubr. Used?	Presence of any genital injury	Other details
1	43	<12	Penis only	Not used	No	Memory of penile-vaginal penetration
2	41	12–23	Finger/s only	Not used	Yes	Memory of penetration with 2–3 finger/s
3	21	12–23	Penis + finger/s	Not used	Yes	Memory of penis and finger/s penetration
4	25	<12	Penis only	Not used	Yes	Witness to penetration and symptoms suggestive of vaginal sex
5	24	<12	Penis only	Unknown	Yes	Memory of penile-vaginal penetration
6	31	<12	Unknown	Unknown	No	Symptoms suggestive of vaginal sex
7	42	<12	Unknown	Unknown	No	Symptoms suggestive of vaginal sex
8	21	12–23	Unknown	Unknown	No	Mis-positioned tampon
9	44	<12	Unknown	Unknown	Yes	

outlined above) could have resulted in a lower overall non-consensual group genital injury rate. However, even if none of the eight sustained any genital injury, the overall non-consensual genital injury rate could not have been lower than 45% which is still higher than other similar studies in the literature to date, and remains significant in comparison with the consensual group genital injury rate of 9.9%.

3. Penetration to examination time (PET)

As we identified in our paper, whilst all study participants were examined within 72 h of index penetration, more of the non-consensual group (90%) than the consensual group (28%) were examined within 24 h of index penetration. The study also found that macroscopic detection of genital injury was more likely if a woman was examined within 24 h of penetration than within 24–72 h of penetration [OR 4.88, CI (1.90, 12.54), $p < 0.005$]. We agree that the consent group difference in PET was a potential confounding variable.

When only those women examined within 48 h of vaginal penetration were considered, the difference in genital injury rate for the non-consensual (19/34, 56%) and consensual (6/56, 12%) groups remained significant [OR 10.56, CI (3.57, 31.21), $p < 0.005$]. A PET of 48 h was used in the only other macroscopic consent group comparison study done to date[4]; this study by McLean et al. was discussed in some detail in our paper.

4. Injury definitions

We share Lo et al.'s concerns about the ability of forensic examiners to distinguish between genital injuries and non-injury genital pathology. For this reason, in our study we ensured all examining doctors were experienced in both forensic sexual assault examinations and the examination of normal, healthy and diseased female genitalia.

Any infective, inflammatory or allergic process in skin has the potential to increase its susceptibility to injury by making it more friable and fragile. Infective and inflammatory genital conditions such as candidiasis, trichomonas, herpes, vestibulitis and vestibular gland infections, dermatitis, lichen sclerosus, atrophic vaginitis and psoriasis can alter the nature of the genital skin and mucosa, and increase the likelihood of sex-related injury. Allergic reactions to condoms, spermicides or lubricant gel may also predispose to sex-related injury. The presence or absence of these conditions is therefore crucial information in the interpretation of genital injury findings.

Furthermore, some genital conditions may be difficult to distinguish from genital injuries, such as the superficial 'splits' associated with candidiasis or herpes genitalis, 'abrasion-like' genital herpetic ulcers, and inflammatory genital conditions such as focal vestibulitis or lichen sclerosus which may be confused with 'red bruises'.

In addition to the recording of injuries, that is, lacerations, abrasions and bruises, examining doctors were asked to record any clinical evidence of non-injury genital pathology such as visible signs of infection or inflammation (eg generalised redness, swelling, abnormal vaginal discharge), any genital lesions (eg ulcers, warts), any visible abnormality of the cervix or other abnormal genital finding. Doctors were instructed to perform appropriate tests as indicated by genital symptoms or clinical signs of genital pathology; that is, high vaginal and endocervical swabs for microbiological and viral culture, polymerase chain reaction (PCR) testing of first void urine samples and endocervical swabs and appropriate swabs of any suspicious genital lesions. If not possible to determine whether a genital finding was an injury, appropriate tests were done at the time of examination and/or specialist referral sought to ensure accurate interpretation of the finding. All results were recorded by examining doctors.

In response to the query from Lo et al. about 'non-specific skin splits' or 'vulval fissures', we can clarify that, in our study, if a genital laceration or 'split' was associated with symptoms or signs of genital infection or inflammation, it was deemed as not definitively identified as injury, and was not recorded as such. These 'splits' may have been traumatic lacerations caused more easily in friable infected or inflamed genital tissue, however we are not aware of any defined criteria to distinguish between traumatic 'splits' in diseased tissue and 'splits' that have arisen spontaneously as part of the disease process.

We consider it best practice as part of any forensic genital examination, to document non-injury genital pathology and to formally exclude infection with appropriate tests to ensure reliable interpretation of genital findings. We support the routine collection of a high vaginal swab for microscopy and culture, to exclude candidiasis in any woman found to have a superficial laceration or 'split' on the external genitalia at forensic genital examination.

5. Genital symptoms and pre-existing genital infection

Examining doctors recorded the following genital symptoms if present at the time of examination; vaginal or vulval pain, vaginal bleeding, abnormal vaginal discharge and dysuria. As Lo et al. have noted, more women in the non-consensual group had genital symptoms (39%) than in the consensual group (16%).

In some but not all of the consensual group women who reported genital symptoms, the symptom was the reason for presenting to the doctor for primary care evaluation. Since none of the non-consensual group women who met inclusion criteria, declined to participate in the study, it is unlikely the presence of genital symptoms biased their recruitment to the study as Lo et al. suggest, unless genital symptoms prompted them to report the sexual assault to police. Comment in this regard is beyond the scope of our study.

In an effort to determine whether or not genital symptoms were related to the index vaginal penetration, examining doctors recorded whether the symptoms were present prior to the index vaginal penetration or if they had commenced since the index vaginal penetration. It was hypothesised that genital symptoms present prior to the index penetrative episode might indicate a pre-existing genital condition, with the potential to increase likelihood of injury. More women in the consensual group (9/81, 11%) than the non-consensual group (1/41, 2%) had symptoms with onset prior to the index penetration. More of the non-consensual group had genital symptoms with onset since the index penetration (15/41, 37%) than the consensual group (4/81, 5%). This result may or may not reflect genital pain associated with injury; analysis of study results exploring the nature of genital symptoms and whether or not they were related to genital injury will be the subject of a future paper.

Though beyond the scope of this response to elaborate, it is worth noting that more non-consensual group women were found to have laboratory evidence of genital infection at the time of examination (11/41, 27%) than consensual group women (8/81, 10%). Only four women complained of symptoms with onset prior to penetration, and also had laboratory evidence of infection at the time of examination, a situation that might suggest the presence of genital infection at the time of penetration. All four women were in the consensual group and two of them sustained genital injury. This reflects a higher genital injury rate than for the remainder of the consensual group (2/4, 50%) and could represent susceptibility of infected genital tissue to infection. While these numbers are small and of limited value, this methodology might be a useful means of determining the influence of pre-existing genital infection upon

sex-related genital injury, an important issue which to our knowledge has not been previously addressed.

6. Injury typology and patterns

Results relating to genital injury typology and patterns, though not statistically significant because of small sample size, were considered appropriate for inclusion in our paper because of the relative paucity of existing information about macroscopically detected genital injury typology in the literature. We did not purport to answer questions in relation to genital injury typology and consent; however given that previous studies have attempted predictive models for consent using genital injury pattern,[5] it was appropriate and necessary to refer to this. The unexpected finding that lacerations were the only type of injury to be identified in the consensual group could not be ignored, whether it related to unique characteristics of the study methodology or was merely an artefact of the small sample sizes.

Any information about genital injury typology is valuable because of its potential to inform about mechanism of genital injury causation and to assist with aspects of forensic interpretation that extend beyond the question of 'consent'. The basic forensic principles of injury causation and interpretation that are routinely applied to general bodily injuries should be used when considering genital injury findings, to assist the courts wherever possible. The use of genital photography to minimise inter-observer variation and gain consistency in injury identification, together with standardised injury definitions, examiner protocols and examiner experience, creates the potential for development of comprehensive genital injury databases which will be of immense value in improving our understanding of sex-related genital injury and its forensic relevance.

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Conflict of interest

The authors have no conflict of interest to declare.

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